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L1: Entry 20 of 22

File: USPT

Jul 7, 1998

DOCUMENT-IDENTIFIER: US 5775791 A  
TITLE: Surface emission apparatus

US Patent No. (1):  
5775791

Brief Summary Text (2):

The present invention relates to a surface emission apparatus used for illuminating, from the back, a liquid crystal display panel or the like serving as a body to be illuminated in, e.g., a liquid crystal television, a potable personal computer, or a wordprocessor.

Brief Summary Text (5):

In recent years, however, the size of, e.g., the liquid crystal panel, is increasing, and the area of the light-emitting surface of a surface emission apparatus which serves as the back light of the liquid crystal panel is also increasing. On the other hand, a low-profile surface emission apparatus is demanded to obtain a compact, lightweight system in which a liquid crystal panel or the like is incorporated. When the surface emission apparatus is increased in size at a low profile, in a surface emission apparatus using a conventional light-guide plate, a portion of the light-emitting surface closer to the light source is bright while a portion thereof farther from the light source is dark since light does not easily reach there, leading to a non-uniformity in brightness of the light-emitting surface. Thus, it is difficult to obtain light emission with entirely uniform brightness.

US Reference Patent Number (4):  
5377084

US Reference Group (4):  
5377084 19941200 Kojima et al. 362/31

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L1: Entry 19 of 22

File: USPT

Jul 14, 1998

DOCUMENT-IDENTIFIER: US 5779338 A  
TITLE: Surface light source device

US Patent No. (1):  
5779338

Brief Summary Text (7):

Since such a surface light source device is used, for example, as a backlight for a liquid crystal display unit, it is required to produce a brighter light. However, the above-explained conventional surface light source device cannot provide an enough brightness for such an application. Therefore, various means are suggested on such type of the surface light source devices to increase the brightness of the emitting light.

US Reference Patent Number (2):  
5377084

US Reference Group (2):  
5377084 19941200 Kojima et al. 362/31

**WEST****End of Result Set**

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L1: Entry 22 of 22

File: USPT

Dec 27, 1994

DOCUMENT-IDENTIFIER: US 5377084 A  
TITLE: Surface illuminating apparatus

US Patent No. (1):  
5377084

Brief Summary Text (2):

Present invention relates to a surface illuminating apparatus, and more particularly to a surface illuminating apparatus used mainly as back light for a liquid crystal display.

Brief Summary Text (5):

In the case where the surface illuminating apparatus constructed as the above-mentioned is used for back light of the liquid crystal display, the liquid crystal display, such as words, numerical values, or patterns, displayed throughout an entire liquid crystal display panel, need be recognized with uniform vision of an operator. Therefore, it is required to maintain throughout the entire surface of the liquid display panel a brightness uniformity higher than a predetermined value. Moreover, it is desired that the liquid crystal display, such as, words or numerical values, displayed on the liquid crystal display panel, even when viewed not only at a right angle with respect to the center of the display surface, but also in a range of an angle of visibility shifted at a predetermined angle (generally 60.degree.) vertically and horizontally with respect to the center of the display surface, can be recognized with uniform vision.

Brief Summary Text (6):

The conventionally proposed surface illuminating apparatus cannot obtain sufficiently high brightness while keeping a uniform ratio of illuminance throughout the entire surface of the liquid crystal display panel, thereby creating the problem that the liquid crystal display cannot easily be recognized with uniform vision in a range of angles of visibility.

Brief Summary Text (9):

In any case, the light condensing effect is low to thereby remain the problem in that a brightness in the range of an angle of visibility is insufficient, whereby sufficient recognition with uniform vision cannot be obtained over the entire surface of the liquid crystal panel.

Brief Summary Text (15):

The plurality of spotted projections 7 condense and diffusion function, on so that the light which having passed through the transparent plate 2 to effectively condense the light and the condensed light can be diffused, whereby while keeping a uniform ratio of illuminance, the brightness can be raised in the range of angle of visibility. Accordingly, when the present invention is applied to a liquid crystal display panel, greater recognition and uniform vision can easily be achieved throughout the entire surface of liquid crystal display panel.

Detailed Description Text (20):

Generally, in the case where the apparatus is applied to a liquid crystal plate, the angle of vision is 60.degree. and it is required that the liquid crystal display is properly recognized in a uniform vision in a range of shifting vertically and

horizontally at 30.degree. each with respect to the position when vertically viewed at the center of the display surface of the liquid crystal display plate, the angle of vision in Table 3 being included in a range between 90.degree. and 60.degree..

Detailed Description Text (30):

As seen from above, the light guide plate of present invention is provided at its outer surface with a plurality of spotted projections 7 regularly disposed and having a light condensing and diffusing function, so that the light having passed through the transparent plate 2 can effectively be condensed by the spotted projections 7 and thus condensed light can efficiently be diffused, whereby the brightness can be higher than that of the conventional apparatus while keeping the desired uniformity ratio of illuminance and without increasing the total thickness of the apparatus. Accordingly, in the case where the apparatus of the present invention is applied to a liquid crystal display panel, recognition in uniform vision can easily be performed throughout the entire surface of the liquid crystal display panel.